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Fig. 1

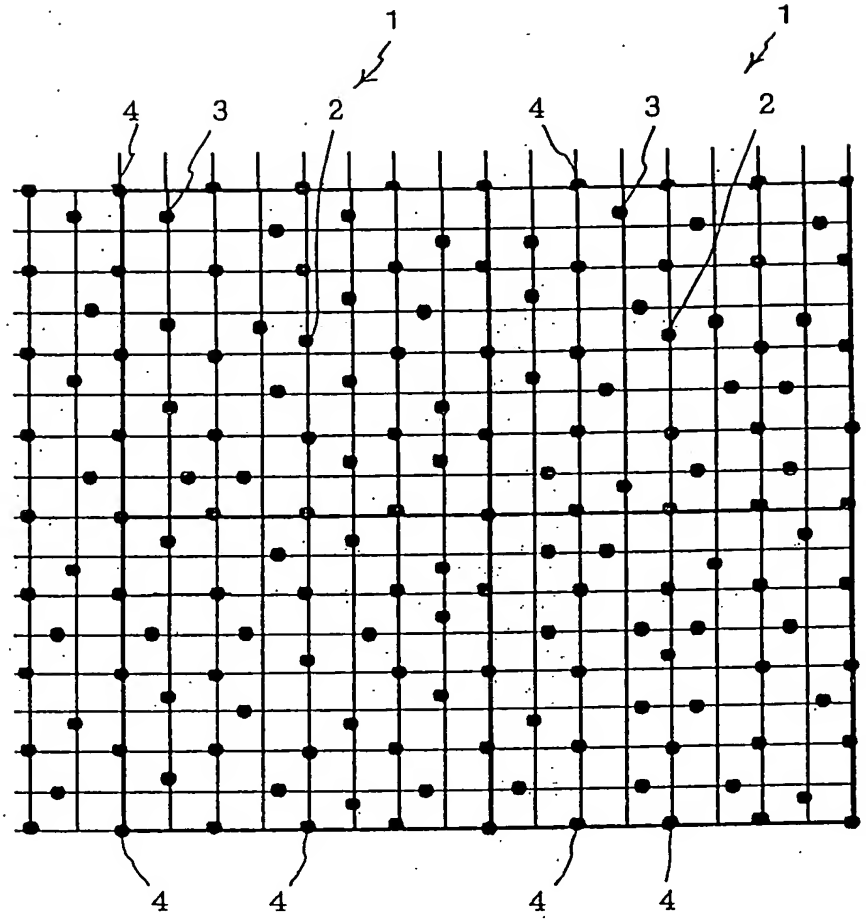

Fig. 2

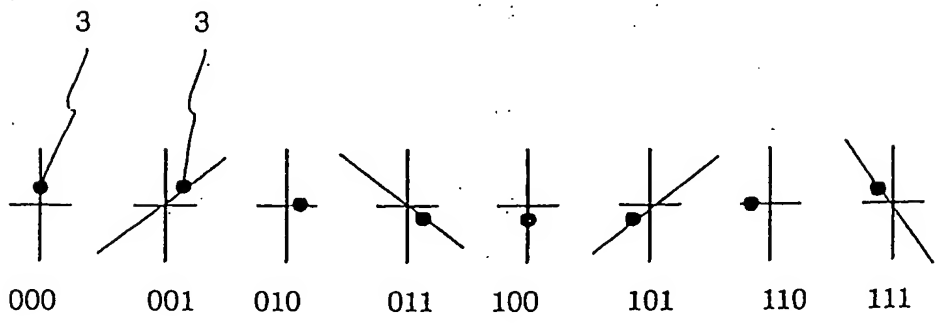

Fig. 3

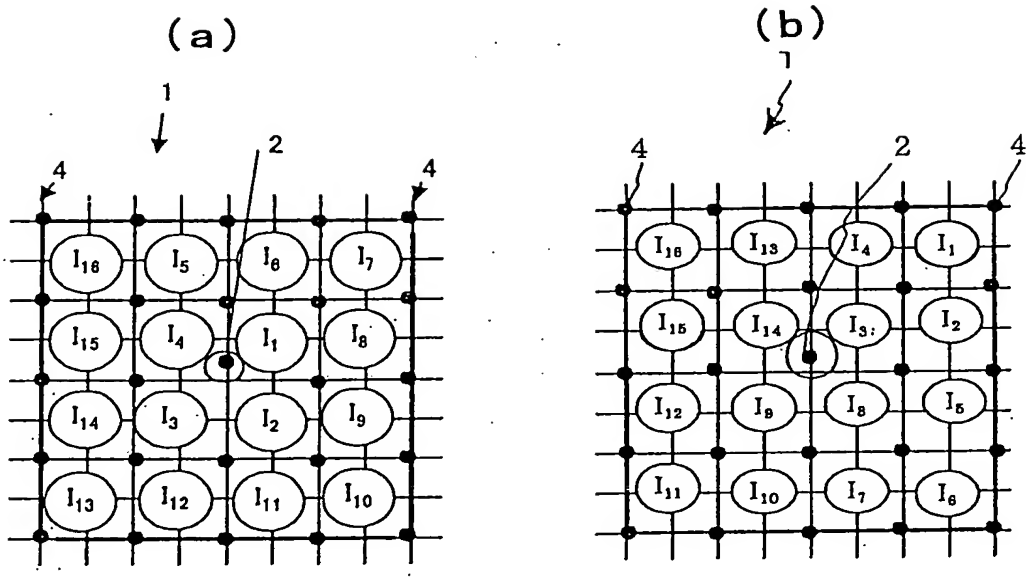
(a)
1
2
4
4
I16 I5 I6 I7
I15 I4 I1 I8
I14 I3 I2 I9
I13 I12 I11 I10
(b)
1
4
2
4
I16 I13 I4 I1
I15 I14 I3 I2
I12 I9 I8 I5
I11 I10 I7 I6

Fig. 4

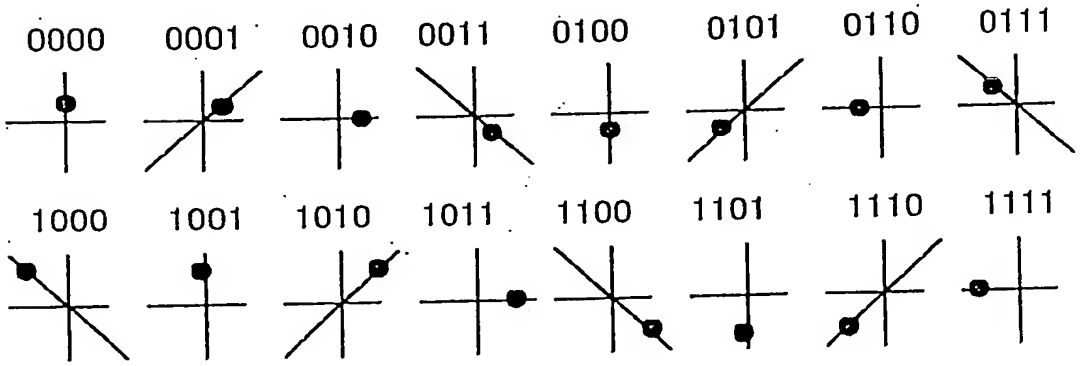
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111

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Fig. 5

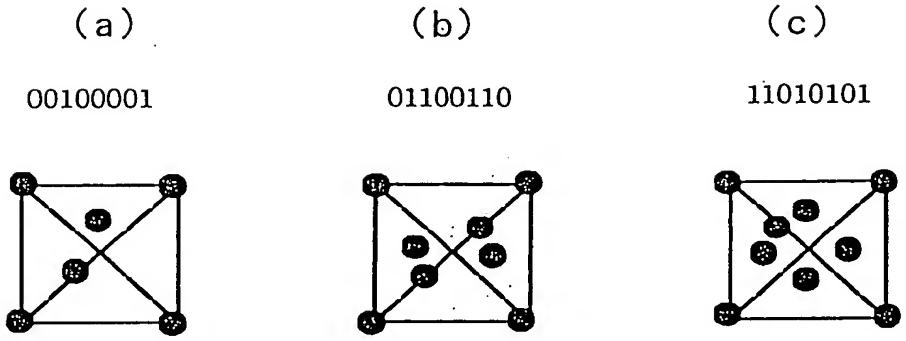

Fig. 6

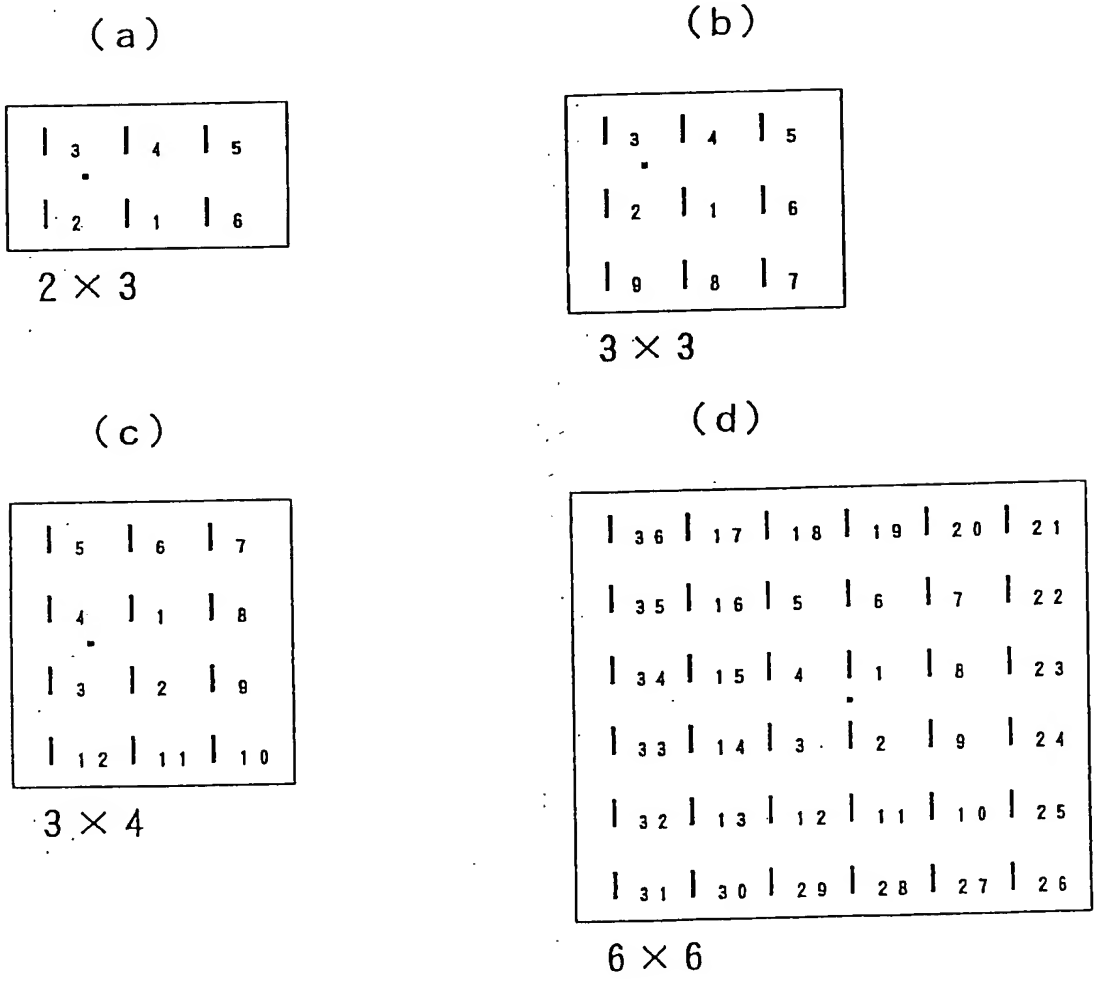

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Fig. 7

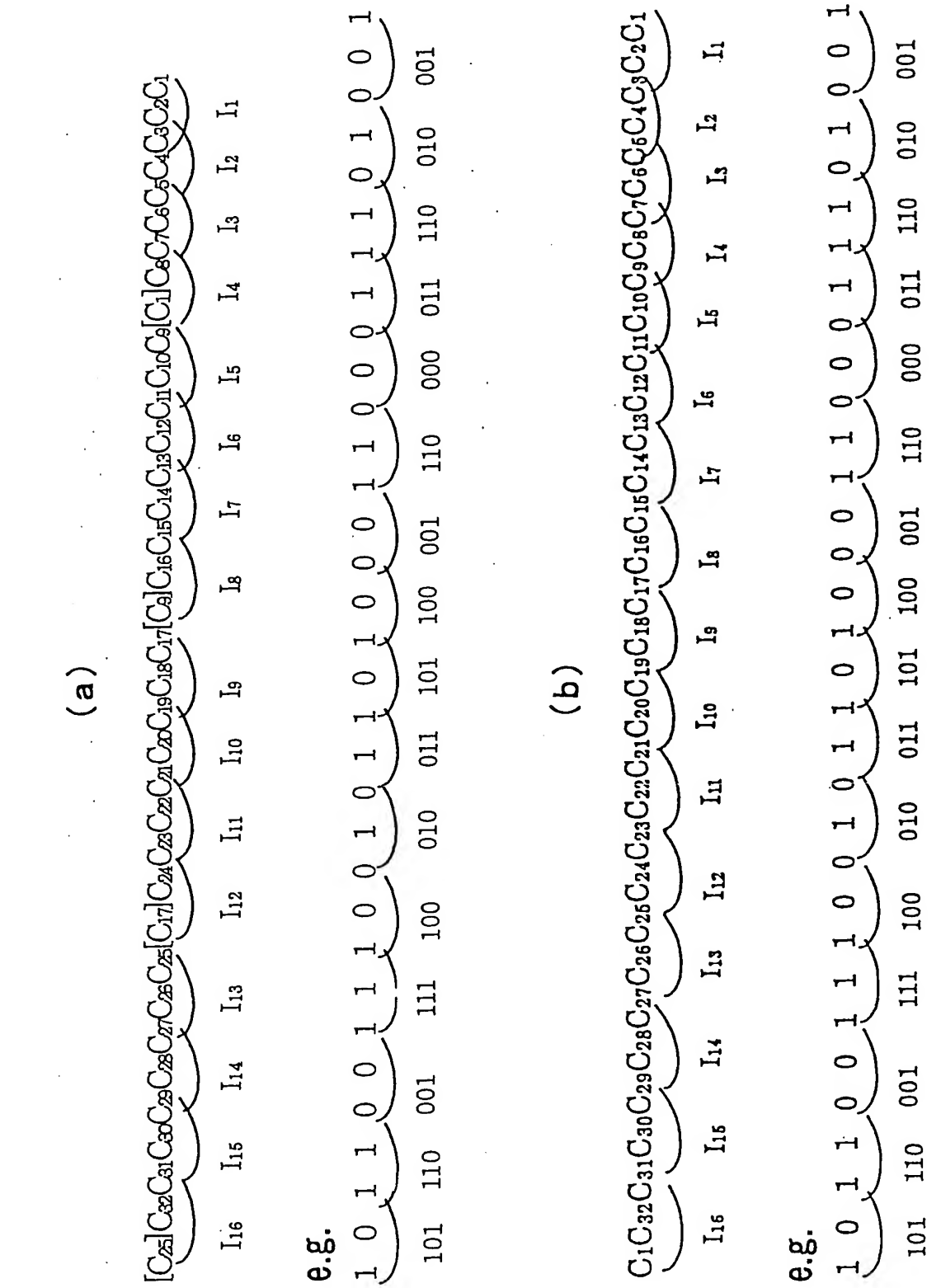

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Fig. 8

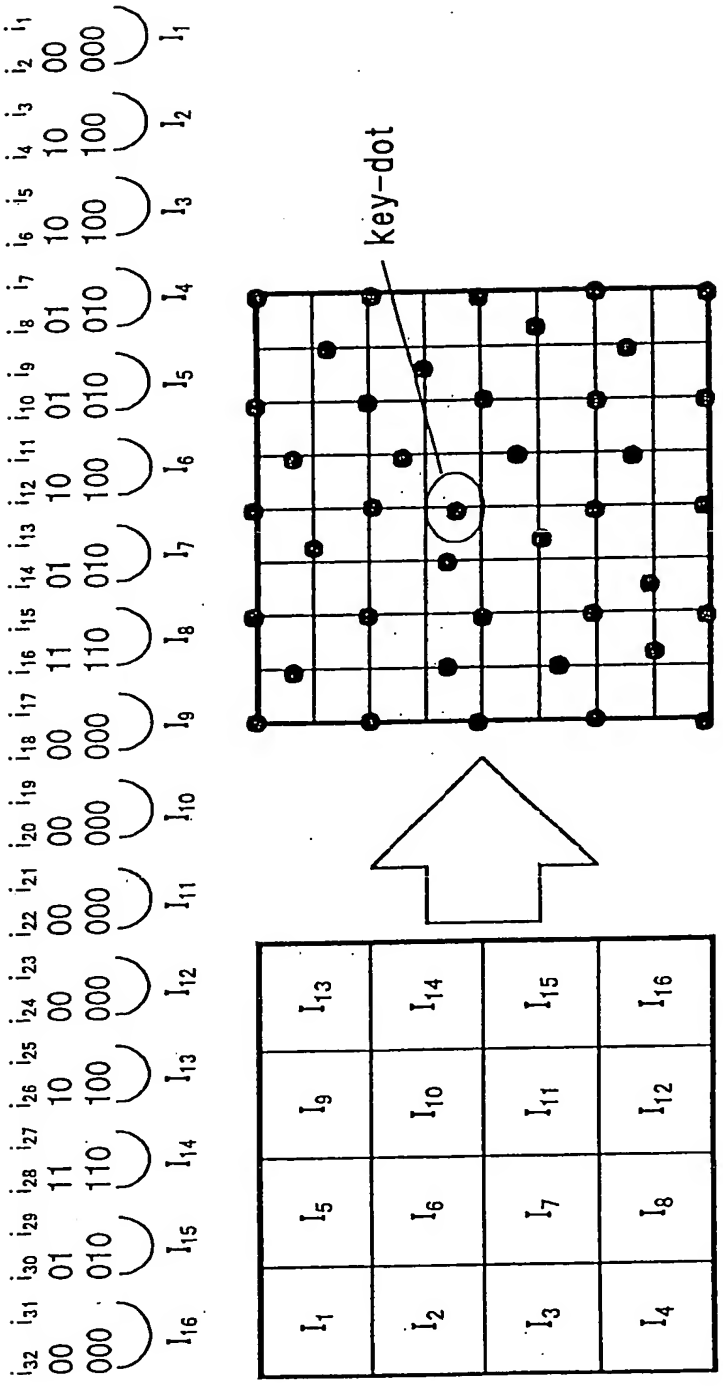

Fig. 9

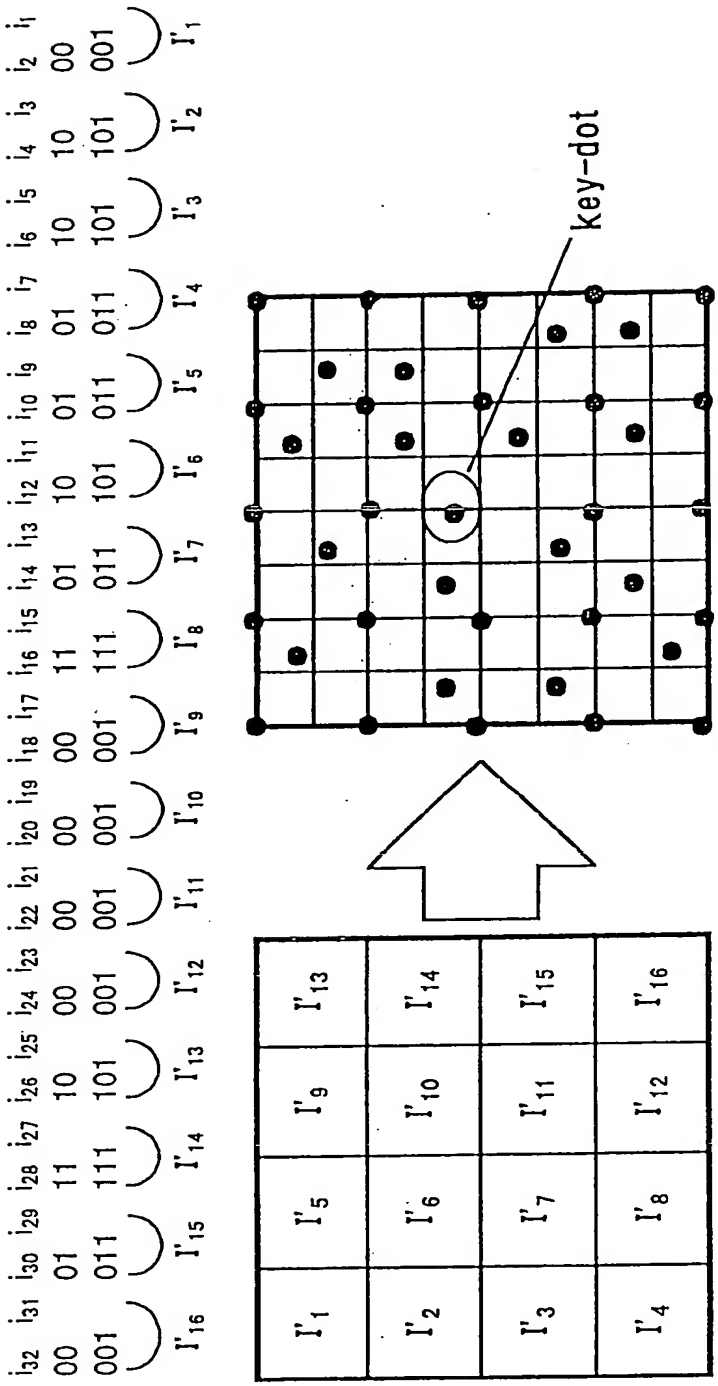

Fig. 10

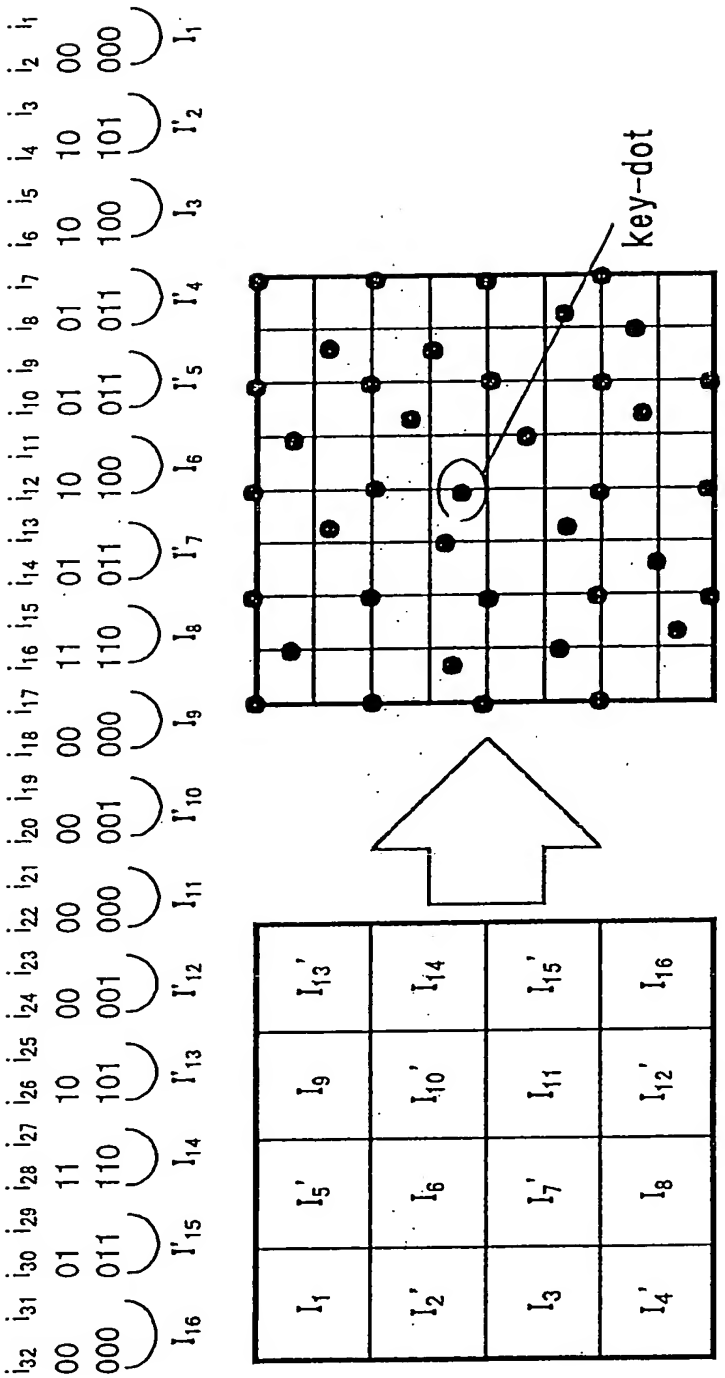

Fig. 11

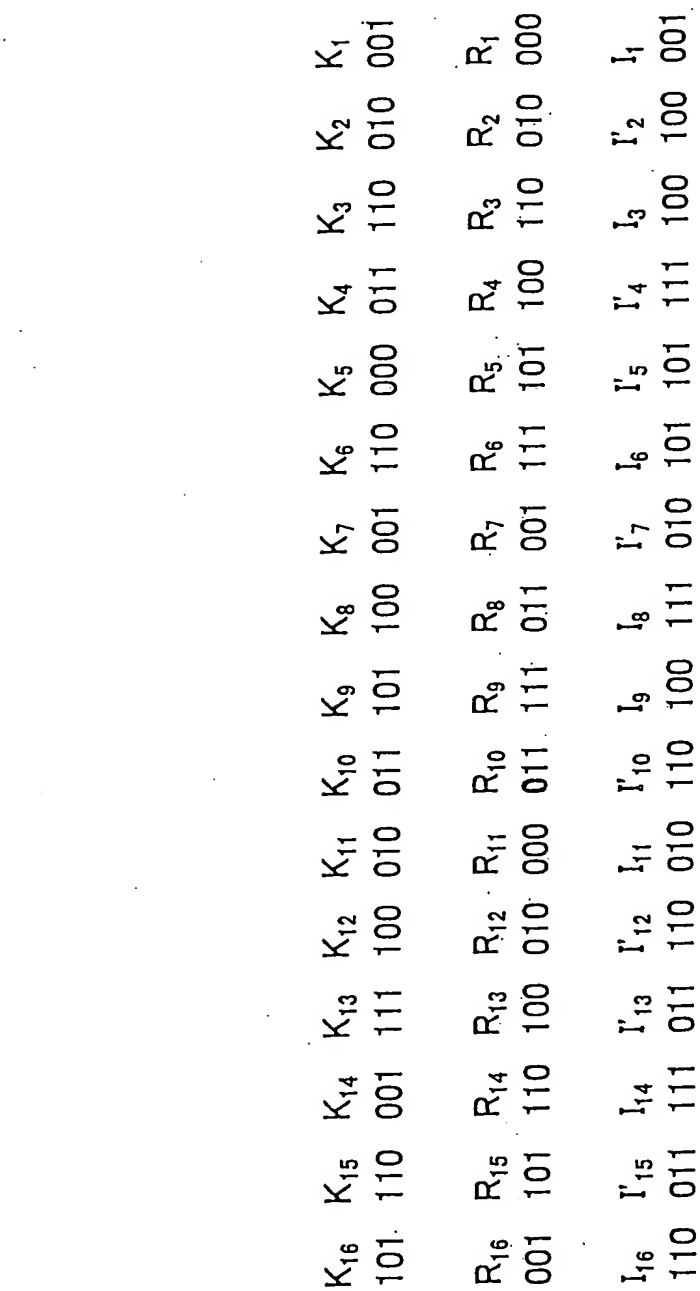
K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14 K15 K16
001 010 110 011 000 110 001 100 101 011 010 100 111 001 110 101
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16
000 010 110 100 101 111 001 011 111 011 000 010 100 110 101 001
I1 I'2 I3 I'4 I'5 I6 I'7 I8 I9 I'10 I11 I'12 I13 I14 I'15 I16
001 100 100 111 101 101 010 111 100 110 010 110 011 111 011 110

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Fig. 12

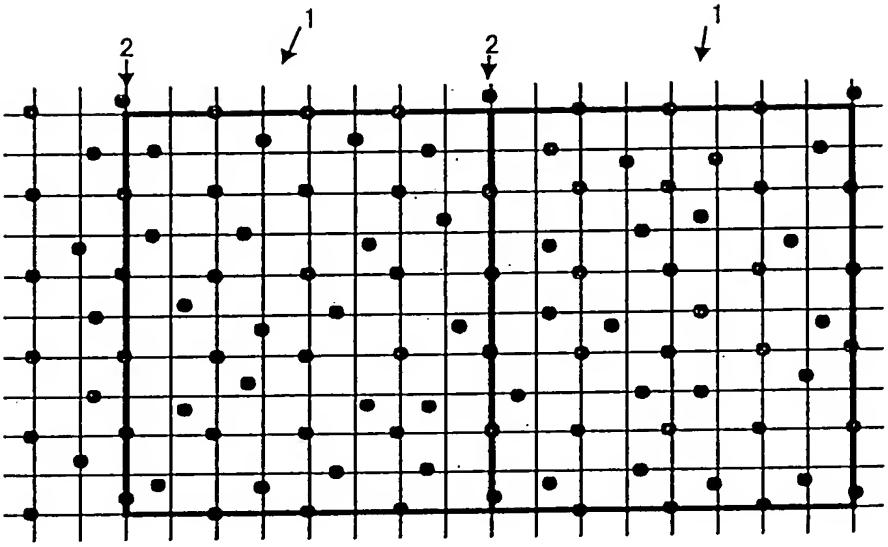


Fig. 13

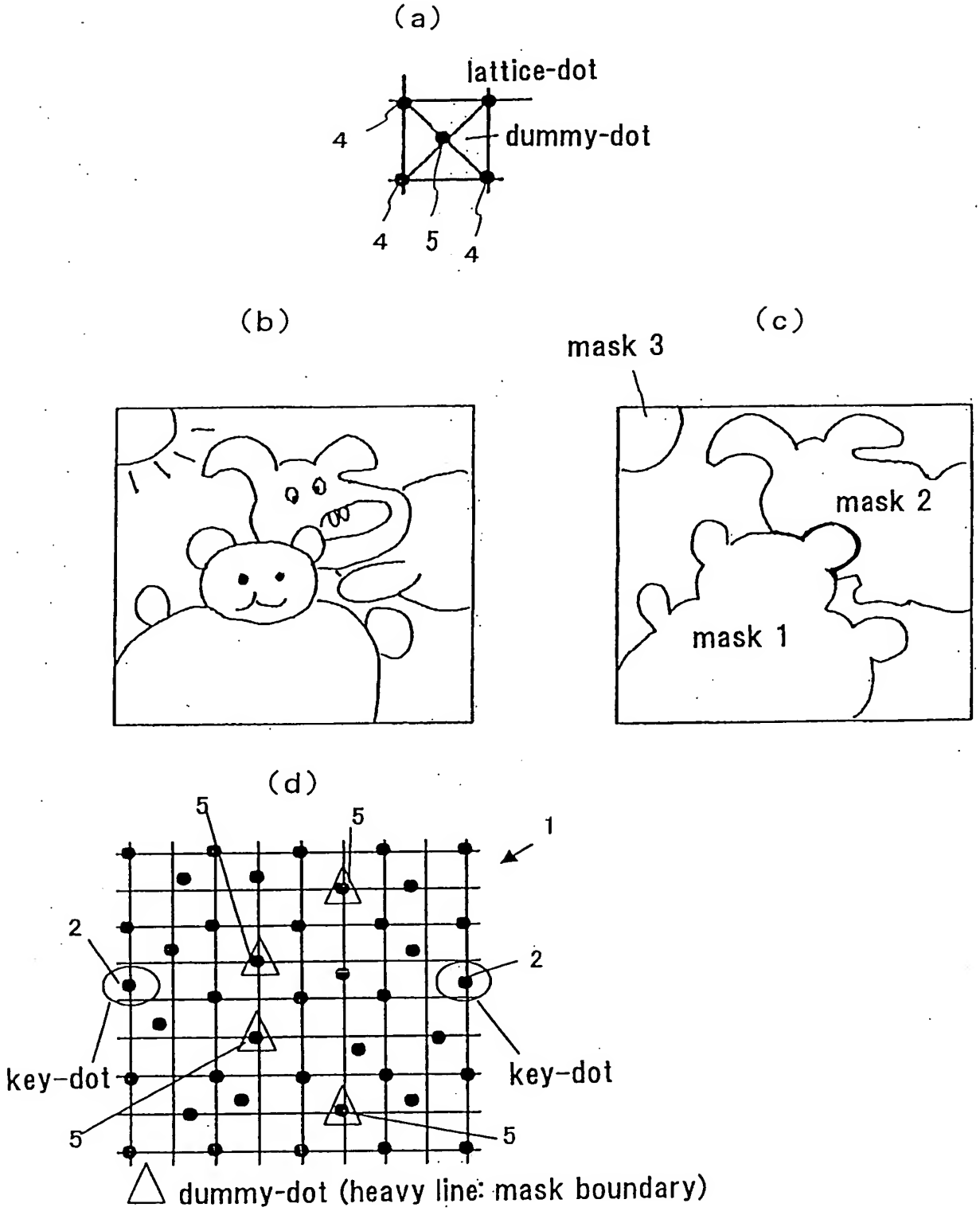
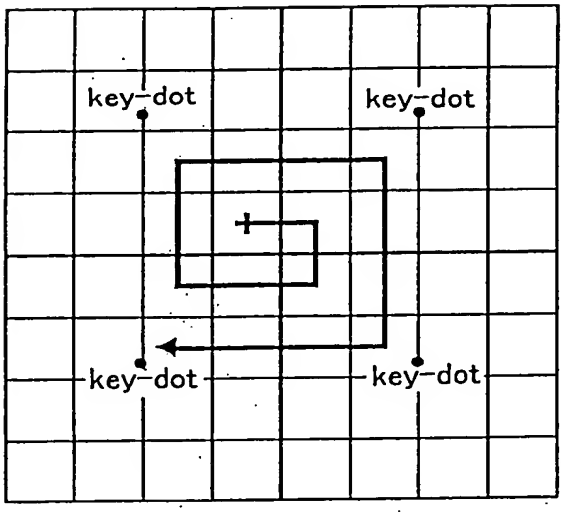

(a)
lattice-dot
dummy-dot
4
4
5
4
(b)
(c)
mask 3
mask 2
mask 1
(d)
5
5
1
2
2
key-dot
key-dot
5
5
dummy-dot (heavy line: mask boundary)

Fig. 14

(a)

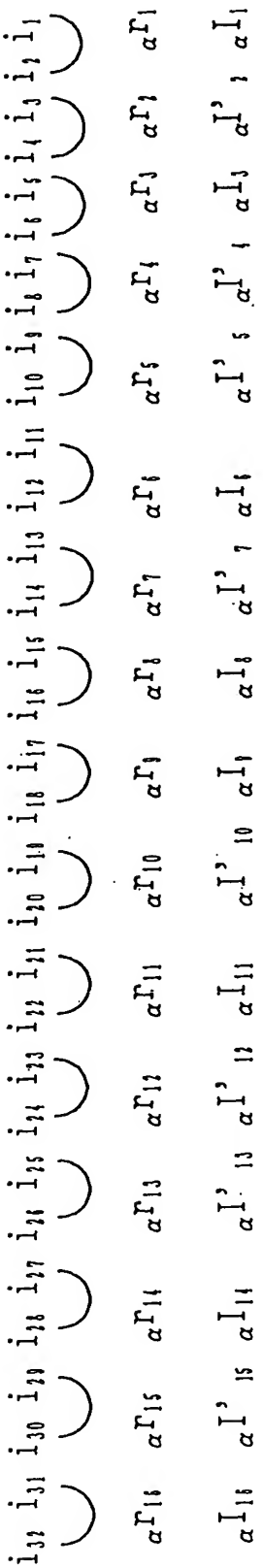


(b)

$_{11}I_1$	$_{11}I_5$	$_{11}I_9$	$_{11}I_{13}$	$_{12}I_1$	$_{12}I_5$	$_{12}I_9$	$_{12}I_{13}$
$_{11}I_2$	$_{11}I_6$	$_{11}I_{10}$	$_{11}I_{14}$	$_{12}I_2$	$_{12}I_6$	$_{12}I_{10}$	$_{12}I_{14}$
$_{11}I_3$	$_{11}I_7$	$_{11}I_{11}$	$_{11}I_{15}$	$_{12}I_3$	$_{12}I_7$	$_{12}I_{11}$	$_{12}I_{15}$
$_{11}I_4$	$_{11}I_8$	$_{11}I_{12}$	$_{11}I_{16}$	$_{12}I_4$	$_{12}I_8$	$_{12}I_{12}$	$_{12}I_{16}$
$_{21}I_1$	$_{21}I_5$	$_{21}I_9$	$_{21}I_{13}$	$_{22}I_1$	$_{22}I_5$	$_{22}I_9$	$_{22}I_{13}$
$_{21}I_2$	$_{21}I_6$	$_{21}I_{10}$	$_{21}I_{14}$	$_{22}I_2$	$_{22}I_6$	$_{22}I_{10}$	$_{22}I_{14}$
$_{21}I_3$	$_{21}I_7$	$_{21}I_{11}$	$_{21}I_{15}$	$_{22}I_3$	$_{22}I_7$	$_{22}I_{11}$	$_{22}I_{15}$
$_{21}I_4$	$_{21}I_8$	$_{21}I_{12}$	$_{21}I_{16}$	$_{22}I_4$	$_{22}I_8$	$_{22}I_{12}$	$_{22}I_{16}$

y - coordinate
x - coordinate
y - coordinate
x - coordinate

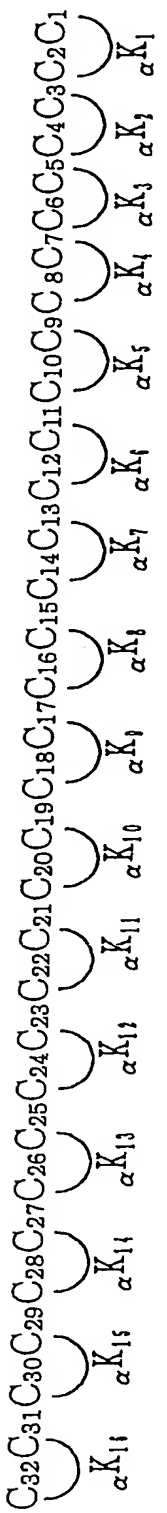
Fig. 15



information-block

αI_1	$\alpha I'_5$	αI_9	$\alpha I'_{13}$
$\alpha I'_2$	αI_6	$\alpha I'_{10}$	αI_{14}
αI_3	$\alpha I'_7$	αI_{11}	$\alpha I'_{15}$
$\alpha I'_4$	αI_8	$\alpha I'_{12}$	αI_{16}

Fig. 16



data-block

αK_1	αK_5	αK_9	αK_{13}
αK_2	αK_6	αK_{10}	αK_{14}
αK_3	αK_7	αK_{11}	αK_{15}
αK_4	αK_8	αK_{12}	αK_{16}

Fig. 17

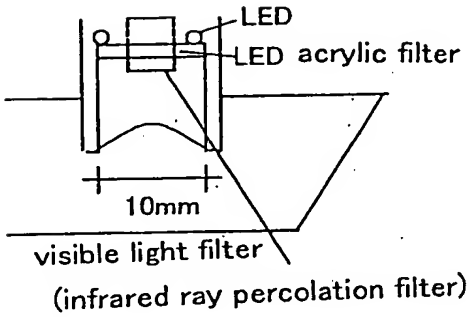

LED
LED acrylic filter
10mm
visible light filter
(infrared ray percolation filter)

Fig. 18

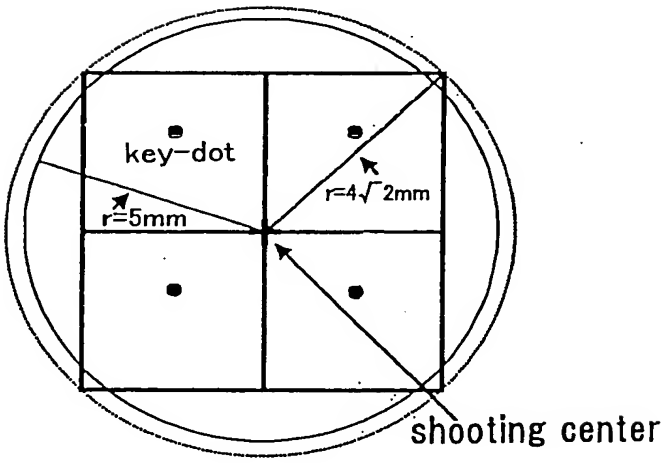

key-dot
r=5mm
r=4√2mm
shooting center

Fig. 19

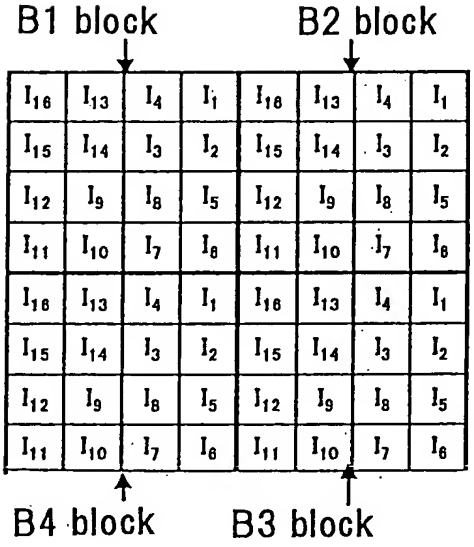

B1 block
B2 block
B4 block
B3 block
I16 I13 I4 I1 I16 I13 I4 I1
I15 I14 I3 I2 I15 I14 I3 I2
I12 I9 I8 I5 I12 I9 I8 I5
I11 I10 I7 I6 I11 I10 I7 I6
I16 I13 I4 I1 I16 I13 I4 I1
I15 I14 I3 I2 I15 I14 I3 I2
I12 I9 I8 I5 I12 I9 I8 I5
I11 I10 I7 I6 I11 I10 I7 I6

Fig. 20

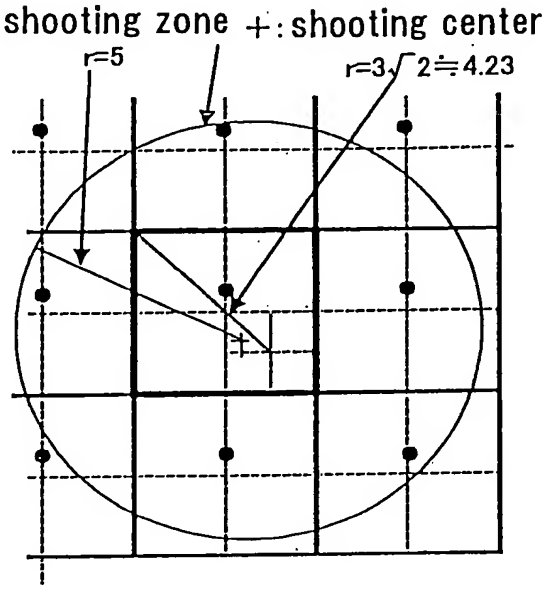


Fig. 21

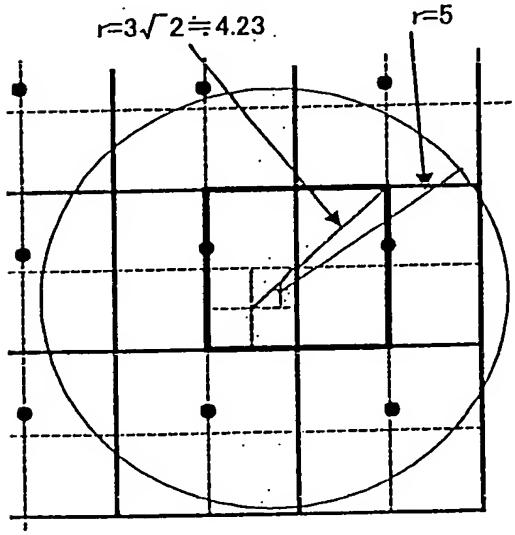


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Fig. 22

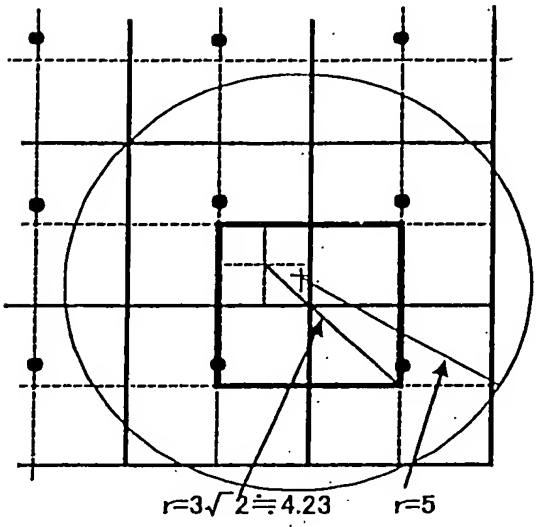
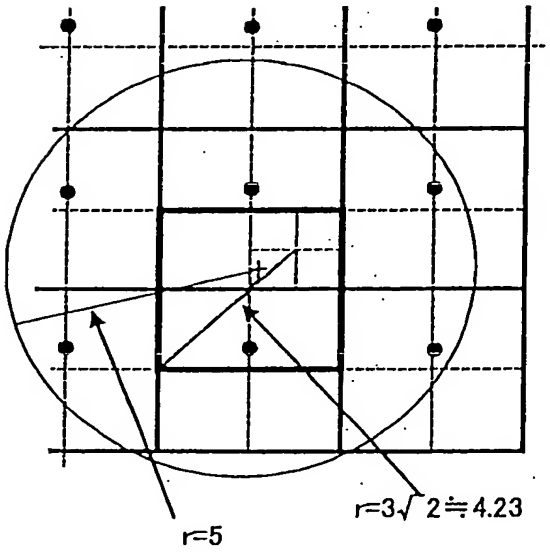
Fig. 23